Homework for Session 2: reading Chi (2008)

This document lays out in more detail what I would like you to do as homework for the next CERE session. The main focus of session-2 is the Chi et al. (2008) paper; and I want to spend considerable time on student discussion in small groups about it. This won't be useful unless you have done some preparation. On the other hand, this is a long and complex paper so there is almost no chance that even the most hard working student will have grasped all the worthwhile points. It follows from this, that we should:

a) Prioritise what's most important to try to understand first,
b) Come to class with the questions you most need answered from the session.
c) And, perhaps, divide the work to some extent amongst different students.

Generic instructions for all of this

For the assignments for all three groups, and for the "topic 0" assignment for all students, the generic instructions are:- first alone, and then where possible in discussion (probably online) with other members in your Reading Group:

1. Do the focussed reading and try to satisfy yourself about the questions.
2. Make a list of what you don't understand (yet) that is part of your assignment: formulate the questions you want answered in the session and/or from students in your group.
3. Compile additionally a (joint) list of the questions to ask students in other groups about their briefs. These will be more focussed if you have spent a little time on the other groups' briefs to see what you can pick up from a quick look at the material, so that the questions are what need more work which you hope others could save you.

Specific goals for each part of the assignment

Topic 0: what everyone should tackle:

- Read the abstract and conclusion to get a general idea of the paper
- Dig into the methods section (both procedure and materials subsections at least) and get a detailed grasp on what exactly the learners do in the two most important conditions: in the face to face tutorial ("tutoring"), and in the watching the tutorial with a peer ("observing tutoring collaboratively"). In a paper about learning designs, there is no point in looking at theories, nor at evidence about theories, unless you understand what the learning context and actions actually are. There is nothing tricky and technical here: it is just that 3-word phrases naming a condition do NOT, by themselves, convey to a first time reader what is meant.

Reading Group A:

The most dramatic conclusion which might be drawn from this paper is that students watching a video of a tutorial can learn as much as students in the tutorial.
Is there a sound argument supporting the replacement of "tutoring" by "observing tutoring collaboratively";? what are the key steps in this argument?

Further questions would include:

- *If this is true, does that mean we don't need to pay tutors any more (apart from one to make the video)?*
- *How strong is the evidence for this?*
- *How is this possible?*
- *What does it show about how students learn from tutorials?*

Reading Group B:
A key concept of Chi's, from which this study evolved, is that the most profound learning is when learners are active, and constructive. This is discussed and generalised in the main paper (Chi et al. 2008) as "hypotheses about why human tutoring is effective", and is further generalised in Chi (2009); but an early recognition of this was in a paper on "self-explanations" (Chi et al., 2001): looking at students generating their own explanations (not just being told explanations by others).

The task of this group is get a grasp of this formulation in the main paper, where Chi thinks it important but it is in fact only one part of the paper.
And secondly, time permitting, look at the Chi (2001) findings on self-explanation from which it originated.

- What is the definition of "self-explanation"?
- What is the theoretical assertion, what is the structure of the argument, how solid is it?

Reading Group C:
Is all peer discussion equally good? What defines the kind of peer discussion that her paper shows is as good as personal tuition by an expert?

Many staff and students assume that all peer interaction and groupwork are equally valuable (or equally low value for actual learning): but this is not true, and the comparisons in the experiment in the main paper directly show this non-equal-utility.

State an argument about this, and select evidence from this paper to buttress that argument. This will mean getting a grip on the exact differences in procedure and materials between the different conditions which include some peer interaction, including the "tutoring" condition.

- What defines the kind of peer discussion that her study shows is as good as personal tutoring?
- Is it peer discussion alone that is the key factor for seeing the benefit?

Resources
1) Contacting other students allocated to the same reading group as you: go to the CERE Moodle page and find in the right hand side menus the Participants list. There you can get the emails of any student on this course; filter the list down to just your group by setting at the top of the page "Visible groups" to (for example) "ReadingGroupB".
You can also use the forums on that page: the "private" one will show posts just to the group you are in. But feel free to contact them any way you find natural and convenient.

2) All the reading you might want is in this special list of all Chi's papers:
http://www.psy.gla.ac.uk/~steve/courses/cereRefsChi.html

and the more important are also in the main course reading list:
http://www.psy.gla.ac.uk/~steve/courses/cereRefs.html

3) The most important refs for this assignment are duplicated here:

Chi,M.T.H., Roy,M. & Hausmann,R.G.M.(2008) "Observing tutorial dialogues collaboratively: Insights about human tutoring effectiveness from vicarious learning" *Cognitive Science* vol.32 no.2 pp.301-341 doi:10.1080/03640210701863396 or http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.128.4906

Craig,S.D., Chi,M.T.H. & VanLehn,K.(2009) "Improving classroom learning by collaboratively observing human tutoring videos while problem solving" *Journal of educational psychology* vol.101 no.4 pp.779-789 doi:10.1037/a0016601 [Craig et al. (2009) is also about the same learning intervention as Chi et al. 2008]

Chi,M.T.H. (2009) "Active-constructive-interactive: A conceptual framework for differentiating learning activities" Topics in Cognitive Science vol.1 no.1 pp.73-105 doi:10.1111/j.1756-8765.2008.01005.x

Chi,M., Siler,S.A., Jeong,H., Yamauchi,R. & Hausmann,R.G. (2001) "Learning from human tutoring" *Cognitive Science* vol.25 no.4 pp.471-533 doi:10.1080/03640210701863396 [self-explanations]

Further background to this assignment

The central pin for this, is reading and being ready to discuss issues around the Chi et al. (2008) paper. What I want is a good discussion next week. Chi08 is the main one, but Craig et al. (2009) is also about the same learning intervention.

This is a long paper; and because even though it is well written, it is full of important stuff, it takes a long time to read. You will not be able to do it in half an hour at the last moment. Start early, take your time, let it sink in. Among other things, it could be taken as evidence that most university academics could be sacked and replaced by video tape. It makes us think about what use university teachers really are, do they matter and how.

Its position in the course concerns what role do teachers have, the hypothesis that the value of a teacher is in personal tutoring (contingent interaction), which fits some of the "best experiences" that came up in discussion. Bear in mind that teachers may, contrary to an argument I outlined in class, have other important ways of promoting learning: remember that possibility, but we will focus this discussion on whether and how tutoring matters to learning.

One reason I picked it, is because if you were to read only one paper for CERE, this would be on the shortlist: it's good in many different ways. The main reason, though, is that it relates to a number of different interesting and important issues so I'm using it as a gateway into those issues and hence into the course. (E.g. it relates to the cost and practical importance of a teaching method, but also to theory; and to fundamental issues both of tutoring (what a good teacher does), and of how important peer interaction can be in producing learning.)

It is however quite hard to read, even though it is well written: there just is a lot to deal with in it. I suggest you start by spending, say, half an hour getting an overall sense of the paper e.g. by reading the abstract and conclusion, visiting the methods section so you understand exactly what the learners had to do (often the key part of educational papers).

Additional important issues to understand better might be:

1) The most basic phenomenon here seems to be the idea of "self-explanation" (getting learners to generate their own explanations, not just telling them). Can't really understand Chi08 without that, I'll focus on that. Chi01 may be a good starting point.

2) Is peer discussion alone what is important?: after all both those with the tutor, and with only the video, discuss things with each other. Focus on peer discussion. One way to see a whole argument on how this works would be to read Draper09a (on "catalytic" assessment).

3) Is contingent tutoring the important underpinning here? Can't dismiss it, nor see why tapes of tutoring could work, without understanding that first. Read the 3 Wood et al. papers on this. (There are 3 papers on essentially the same studies: reading them all isn't much more work than reading one, from the point of view of understanding the one big idea.)

4) If this technique is right, it is hugely important because it would allow a very expensive resource (excellent tutoring) to be rolled out to classes of hundreds. So an intensive scrutiny of the Chi08 study (and Craig09) to see a) is the evidence sound? b) can we see any prospect of generalising from secondary school physics problem solving, to university teaching of (say) psychology? or English? Or is this paper marginal to education in general, not the deep breakthrough I implied it could be?

5) This whole thing just isn't convincing. Surely a student working by themselves (with books) is in reality the heart of HE learning, and tutors make at most a marginal contribution. 5b) [or] surely a great and engaging lecture exposition is the heart of HE learning .... I.e. monologue not dialogue is the most useful, if done well (after all, it's clear that only great tutoring, not average tutoring, makes a difference, so comparing it to great exposition is fair). If you go this route, you need to find some literature / evidence to develop your counter-position.